

Investing in Science Teacher Leadership

Strategies and Impacts in the
NGSS Early Implementers Initiative

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NGSS Early Implementers Initiative: Bringing science to life as a core subject in K–8 classrooms

A diverse group of eight California school districts and two charter management organizations is actively implementing the Next Generation Science Standards (NGSS). Their progress, experiences, and lessons can inform others implementing the NGSS. The NGSS Early Implementers are supported by the K–12 Alliance at WestEd, and work in partnership with the California Department of Education, the California State Board of Education, and Achieve. Initiative funding is provided by the S. D. Bechtel, Jr. Foundation, with the Hastings/Quillin Fund supporting participation by the charter organizations.

The Initiative spans 2014 to 2020. It focuses on NGSS implementation in grades K–8 and incorporates the integrated course model (preferred by the California State Board of Education) for middle school.

Teachers are supported with strategies and tools, including an instructional framework that incorporates phenomena-based learning. This framework aligns with the three NGSS dimensions: disciplinary core ideas, crosscutting concepts, and science and engineering practices. Using science notebooks, questioning strategies, and other approaches, students conduct investigations, construct arguments, analyze text, practice descriptive skills, articulate ideas, and assess their own understanding.

Teachers engage in science lesson studies twice each year through a Teaching Learning Collaborative. In each district, the Initiative is guided by a Core Leadership Team of Teacher Leaders and administrators who participate in additional professional learning and coaching activities. Together, this core team and an extended group of Teacher Leaders are the means for scaling NGSS implementation throughout the district.

Learn more about this multi-year initiative and access evaluation findings as well as instructional resources at k12alliance.org/ca-ngss.php.



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Suggested citation: Tyler, B., Britton, T., Nilsen, K., Iveland, A., & Nguyen, K. (2019). *Investing in science teacher leadership: Strategies and impacts in the NGSS Early Implementers Initiative*. San Francisco, CA: WestEd.

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Evaluation of the NGSS Early Implementers Initiative

The S. D. Bechtel, Jr. Foundation has commissioned WestEd's STEM Evaluation Unit to evaluate the NGSS Early Implementers Initiative in the eight participating public school districts. This independent evaluation is advised by a technical working group that includes representatives of the California Department of Education and the State Board of Education. Evaluators investigate three main aspects of the Initiative's NGSS implementation:

- districts' local implementation,
- implementation support provided by K–12 Alliance, and
- the resulting science teaching and leadership growth of teachers and administrators, as well as student outcomes.

In addition to this current Report #7, evaluators previously released:

- *The Needle Is Moving in California K–8 Science: Integration with English Language Arts, Integration of the Sciences, and Returning Science as a K–8 Core Subject* (Evaluation Report #1, October 2016)
- *The Synergy of Science and English Language Arts: Means and Mutual Benefits of Integration* (Evaluation Report #2, October 2017)
- *Administrators Matter in NGSS Implementation: How School and District Leaders Are Making Science Happen* (Evaluation Report #3, November 2017)
- *Developing District Plans for NGSS Implementation: Preventing Detours and Finding Express Lanes on the Journey to Implement the New Science Standards* (Evaluation Report #4, February 2018)
- *Next Generation Science Standards in Practice: Tools and Processes Used by the California NGSS Early Implementers* (May 2018)
- *Making Middle School Science Whole: Transitioning to an Integrated Approach to Science Instruction* (Evaluation Report #5, October 2018)
- *Engaged and Learning Science: How Students Benefit from Next Generation Science Standards Teaching* (Evaluation Report #6, November 2018)

Executive Summary

While reports about teacher leadership are common, the story of leadership development in the California K–8 NGSS Early Implementers Initiative (known in short as the Early Implementers Initiative) has some unique aspects worth reading about.

Many projects aiming to implement widespread changes in teaching use a train-the-trainers model. That is, some teachers participate in professional learning, and they, in turn, provide professional learning to other teachers.

The Early Implementers Initiative strongly expanded upon this model. The Initiative deeply prepared teachers for the foundational role of being leaders in how to implement science teaching called for by the Next Generation Science Standards (NGSS). However, the Initiative also explicitly prepared teachers to become catalysts for change in their districts.

This seventh report in a series of evaluation reports about the Initiative is intended primarily for state and district leaders, including school principals, and leaders of teacher professional learning. Based on extensive observations, interviews, and surveys, the report describes teacher leadership development and its benefits in the first four years (2014–2018) of the six-year Initiative. The report describes how the Initiative prepared teachers for leadership in NGSS teaching, including how it created a culture of collaboration that produced change agents for science education and NGSS implementation; and how the leadership experience affected teacher leaders' actions and professional growth.

Professional learning for close to 500 teacher leaders was led by WestEd's K–12 Alliance in collaboration with the Initiative's district Project Directors. The participants in each district included dozens of Teacher Leaders who experienced 9 days per year of professional learning. Additionally, about 9 Core Teacher Leaders¹ per district received 12 days per year of further learning opportunities.

The two main vehicles of professional learning every year, experienced by both levels of teacher leaders, were (a) weeklong, Initiative-wide Summer Institutes held centrally for teacher leaders from all districts; and (b) two two-day cycles of Teaching Learning Collaboratives (TLCs, a strong version of lesson studies) held during the school year.

Preparation for Leadership in NGSS Teaching

The Initiative's teacher leaders first needed to understand the standards and gain some experience teaching them. The topics of professional learning evolved over time, from such basics as understanding the structure of the NGSS, to using phenomena to drive instruction, to substantially evaluating instructional materials for their ability to fulfill the standards.

Annual surveys of participants indicated a progressively deeper understanding of the NGSS over the years as well as understanding how to help other teachers transition to the standards. Evaluators saw during classroom observations that Teacher

1 In this report, "Core Teacher Leaders" refers to the teachers who joined the Initiative the first year as part of the Core Leadership Teams. Uppercase "Teacher Leaders" refers to the larger group who joined the Initiative in the second year. Lowercase "teacher leaders" is used to refer collectively to both Core Teacher Leaders and Teacher Leaders.

Leaders were implementing the NGSS in their teaching, which will be described at length in a future report in the evaluation series. Further, 81 percent of Teacher Leaders reported understanding how to help other teachers “fairly well” or “thoroughly” by year four, in contrast to year two when 83 percent of them said that they understood “poorly” or “not at all.”

Additional Leadership Preparation

This report describes the ways that the Initiative:

- Prepared teacher leaders to create a culture of belonging, safety, and collaboration
- Enlisted teachers in leadership opportunities, and also partnered with them as they stepped up to these opportunities
- Explicitly empowered teacher leaders to become change agents able to clearly communicate about the NGSS to stakeholders and work at creating school and district contexts that support implementation

Administrators have noticed growth in teachers as a result of these leadership opportunities, as described by one elementary school principal: “I see the confidence [in teachers] has grown — not only in understanding science content, but being a Teacher Leader and presenting, facilitating, and taking initiative.”

Leadership in Action

The largest section of the report primarily describes two types of leadership actions taken by teacher leaders in their districts:

- Providing formal professional learning about the NGSS to teachers in their districts
- Providing tailored assistance to individuals or small groups in their districts

The professional learning events wherein teachers took leadership roles included presenting at Summer Institutes, facilitating TLCs, presenting at district professional learning sessions, presenting at school-level events, and helping lead family science nights. Survey data indicated that Teacher Leaders provided increasing amounts of technical assistance to colleagues as the Initiative progressed: the percentage of Teacher Leaders who reported sharing ideas with colleagues “frequently” or “occasionally” jumped from 36 percent in 2014–15 to 74 percent in 2015–16, then continued to increase over the next two years to 86 percent in 2017–18.

Impact of the Leadership Experience on Teachers’ Broader Professional Growth

In addition to getting the NGSS implemented within the participating districts, a bonus benefit of the Initiative’s deep leadership development model has been helping many of the Teacher Leaders grow in one or more of these professional ways: advancing within the Initiative, advancing within the district apart from the Initiative, or taking on regional or state leadership roles in science education.

Recommendations for Administrators

The authors briefly discuss several recommendations for encouraging and leveraging teacher leadership in support of NGSS implementation:

- Acknowledge that the NGSS are a big change.
- Focus on peer leadership abilities.
- Make a multi-year implementation plan.
- Make teacher group work a priority.
- Create a cohort of teacher leaders.
- Help the teacher leaders grow.

Introduction

In its first four years, through spring 2018, the Early Implementers Initiative has done two things particularly well. First, the Initiative has helped participating teachers gain a sophisticated understanding of Next Generation Science Standards (NGSS) teaching. This is no small feat, as the standards call for a substantial, multifaceted departure from previous content and pedagogy. Second, many of these teachers have become champions for implementing the NGSS.

It's indispensable in any NGSS implementation model for teacher leaders to become experts in NGSS teaching so that they can aid other teachers. Along those lines, this Initiative has empowered and inspired close to 500 teachers to actively take on more expansive leadership roles, including becoming change agents for NGSS implementation in their schools and districts.

A Vision for Leadership

Expansive teacher leadership has been a strong foundational component of the Early Implementers Initiative from its outset in 2014. District- and school-level leadership is also now recommended by Achieve¹ (2017, p. 6):

Essential to the transition [to the NGSS] is a central office leadership team coupled with site-based leadership, consisting

"I see the confidence [in teachers] has grown — not only in understanding science content, but being a Teacher Leader and presenting, facilitating, and taking initiative." [Elementary school principal]

of individuals who collectively have the managerial authority to make changes such as setting budgets and hiring staff, expertise in science and science instruction, and the ability to communicate clearly with both internal and external stakeholders. . . . The leadership team should include members from both the district and school levels, education professionals who are engaged in implementation efforts, and a representative from an external partnership (e.g., a science center or science, technology, engineering, and math [STEM] coalition).

In designing and launching the Initiative, the Regional Directors of WestEd's K–12 Alliance recognized that such a leadership structure would be needed to support the Initiative's work at multiple levels, from teachers to district leaders. Teachers would be groomed and supported to share what they learned with other teachers who

1. Achieve is an independent, nonpartisan, nonprofit education reform organization dedicated to working with states to raise academic standards and graduation requirements, improve assessments, and strengthen accountability. Created in 1996 by a bipartisan group of governors and business leaders, Achieve is leading the effort to make college and career readiness a priority across the country so that students graduating from high school are academically prepared for postsecondary success. Achieve coordinated the second phase of the NGSS development process on behalf of the lead states and other partners.

had had less training, creating tiers of experience and leadership that would radiate outward from a core team. Early Implementer districts were charged with ultimately reaching all K–8 teachers of science with NGSS-focused professional learning by the end of the six-year Initiative.

Initiative leaders have employed an ambitious train-the-trainer model to ultimately reach all teachers. In project years one to four, a large investment was made in NGSS professional learning for and leadership development of more than 500 teacher leaders. Creating teacher leaders also increases the likelihood that NGSS implementation will stick. As one Regional Director explained, “This culture that ‘you all come and you all can do it’ is what starts the momentum.” Further, rather than providing training focused on rigid, narrow strategies, the Initiative’s model for leadership development has focused heavily on deep and extensive collaboration around authentic tasks.

Organizational Structure of Teacher Leadership in the Initiative

Teachers were recruited to become teacher leaders in two phases. First, a Core Leadership Team of nine teachers and three administrators was established in each district to work with the district Project Director in planning and leading NGSS implementation. In year one of the Initiative, professional learning focused heavily on the teachers in this group, known as “Core Teacher Leaders,”² with the understanding that they would

have a significant role in sharing what they had learned with other teachers.

At the end of year one, each district recruited between 30 and 60 Teacher Leaders (based on the size of the district) to follow in the footsteps of the Core Teacher Leaders who by then had had a full year of intensive NGSS Early Implementer experience. These Teacher Leaders also would play an important role in spreading NGSS learnings to their non-Early Implementer colleagues.

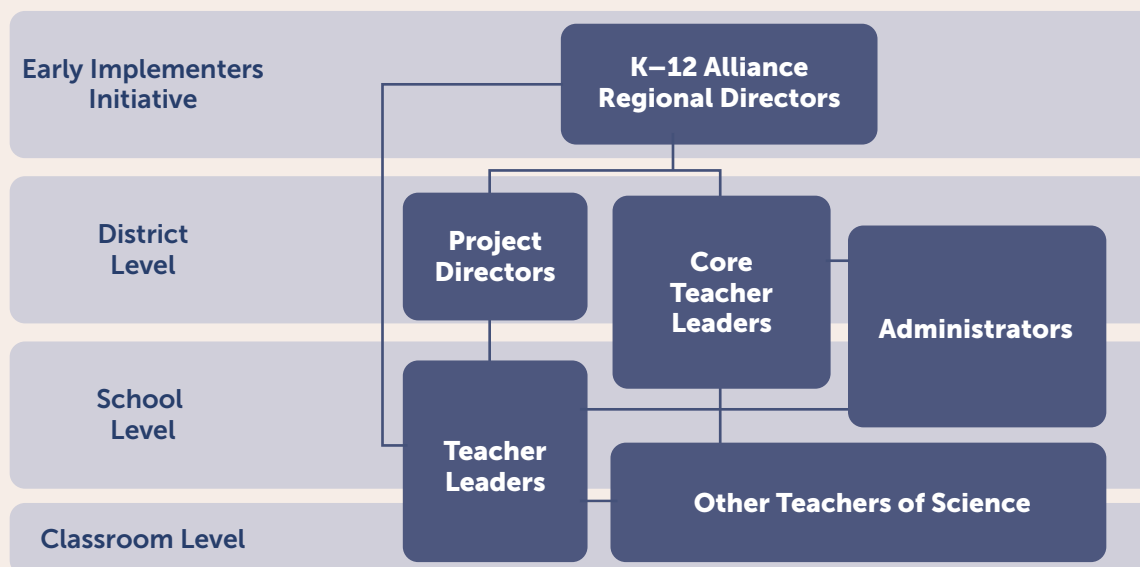
The two groups of teacher leaders fit into a larger network of players, shown in Figure 1, all of whom have some influence in the implementation of the NGSS in a district. At the Initiative level is WestEd’s K–12 Alliance, the organization responsible for leading the Early Implementers Initiative.³ A designated K–12 Alliance Regional Director with deep expertise in professional learning and science education provides ongoing technical assistance to the district Project Director and the Core Leadership Team.

Teacher Leaders, who interact directly with the Core Teacher Leaders, the Project Director, and the Regional Director in different professional learning contexts, are responsible for sharing their expertise with other teachers of science in their districts. Other teachers of science will, of course, make up the majority of the ultimate implementers of the NGSS. While administrators are crucial actors in districtwide NGSS implementation, they are mostly outside the focus of this report on teacher leadership. Their preparation

2 In this report, the label “Core Teacher Leaders” is used to refer to the teachers who joined the Initiative the first year (in the summer of 2014) as part of the Core Leadership Teams. Uppercase “Teacher Leaders” will be used to specifically refer to the larger group who joined the Initiative in the beginning of the second year (i.e., the summer of 2015). When referring to both Core Teacher Leaders and Teacher Leaders together, this report uses lowercase “teacher leaders” or phrases such as “Early Implementer teacher leaders” or “both groups of teacher leaders.”

3 The Initiative was conceptualized by the K–12 Alliance at WestEd in partnership with Achieve, the independent, nonpartisan, nonprofit education reform organization that coordinated the second phase of the NGSS development process on behalf of the lead states and other partners.

Figure 1. Organizational network of participants in a district's NGSS implementation



and roles have been discussed in a previously released evaluation report.⁴

Methods

This is the seventh report in a series of evaluation publications about the Early Implementers Initiative. It primarily draws on the following data sources through spring 2018 (i.e., the first four years of the six-year Initiative):

- Two surveys — one on leadership and one on classroom practices — administered annually to the K–8 teacher leaders who have received extensive professional learning through the Initiative⁵
 - Interviews with 22 case-study teachers across five of the eight districts participating in the Early Implementers Initiative⁶
 - Multiple interviews with each district Project Director
- Appendices A and B provide the specific questions from the surveys and interviews, respectively, that evaluators examined for this report.
- Other data sources for the report include observations of:
- All centralized, Initiative-wide professional learning events
 - A sample of district-level professional learning events
 - One to three of the all-day meetings of the Core Leadership Teams in each district
 - Presentations made by Early Implementer teachers at the annual California Science Education Conference (see Appendix E for presentation titles)

⁴ See *Administrators Matter in NGSS Implementation*, <https://www.wested.org/resources/administrators-matter-ngss-implementation/>.

⁵ Over the four years of the evaluation, survey response rates have ranged from 80 to 100 percent of the 400 to 500 teachers surveyed. See Appendix C for more specific information relating to survey response rates.

⁶ District Project Directors nominated as case-study teachers those who were making some of the most substantial changes in their teaching in relation to the NGSS, spurred by their participation in the Initiative.

Preparation for Leadership in NGSS Teaching

Before Core Teacher Leaders and Teacher Leaders could contribute to the implementation of the NGSS in their schools and districts, they needed to understand the standards and gain some experience teaching them.

Professional Learning Provided

Project Directors received more professional learning and more direct contact with K–12 Alliance Regional Directors than Core Teacher Leaders, who in turn received more professional learning than Teacher Leaders, as shown in Table 1.

- Teacher Leaders attended the five-day annual Summer Institutes and participated in two two-day Teaching Learning Collaboratives (TLCs), the lesson study of the Initiative.⁷
- Core Teacher Leaders attended these events and also participated in six full-day technical assistance meetings with the Regional and Project Directors. The Core Leadership Teams typically held additional meetings, particularly during the first year, when developing their district plans for NGSS implementation.⁸
- Project Directors convened for almost monthly Regional Director–Project Director meetings. These two-day sessions were rich with sharing district NGSS-related activities and progress, getting state-level updates (e.g., on the CA

Science Test and instructional materials), and planning Initiative-wide professional learning events.

The focus of professional learning in the Initiative evolved over time, from basic to increasingly sophisticated. In general, in their first year, teacher leaders were first introduced to:

- The overall structure of the standards
- The crucial role of equity in the NGSS classroom
- A few relatively accessible scientific practices (e.g., modeling, arguing from evidence) as well as beginning sense-making strategies (e.g., notebooks)

As both the K–12 Alliance and the teacher leaders gained understanding of what the NGSS looked like in practice, professional learning gradually progressed to:

- Using phenomena to drive instruction
- Planning lessons around inquiry and student sense-making
- Integrating all the science and engineering practices

In later stages, teacher leaders learned more about:

- How to use the crosscutting concepts to frame student discourse

⁷ For information on the Teaching Learning Collaboratives, see special evaluation report *The NGSS in Practice*: <https://www.wested.org/resources/next-generation-science-standards-in-practice/>. A more in-depth evaluation report on the different configurations of the Teaching Learning Collaboratives in the Early Implementers Initiative is slated to be released in summer of 2019.

⁸ For more on district plans and the Early Implementer planning process, see evaluation report #4, *Developing District Plans for NGSS Implementation*: <https://www.wested.org/resources/developing-district-plans-for-ngss-implementation/>

Table 1. Relative amount of professional learning received by Early Implementer participants

Role (number per district)	Full-time equivalent days per year	Professional learning received
Project Director (N=1)	30	8–9 Initiative-wide planning meetings
Core Teacher Leader (N=6–9)	21	6 Technical Assistance team days: 2 3- to 5-day leadership trainings
Teacher Leader (N=30–60)	9	Summer Institute and 2 TLCs per year

Note: In addition to what is shown, Core Teacher Leaders benefited from professional learning received by Teacher Leaders, and Project Directors attended the professional learning provided for Core Teacher Leaders.

- NGSS-aligned assessment
- Evaluating instructional materials

Further, concurrent professional learning regarding leadership and how to be a change agent similarly evolved over the course of the Initiative (see the next section, Additional Leadership Preparation).

Gains in NGSS Understanding

Surveys were administered to teacher leaders at the end of each school year, asking about experiences during that year. Progressive increases in teacher leader understanding of the NGSS are evident in survey data collected over four years.⁹ For instance, the percentage of Teacher Leaders indicating that they understood the structure of the NGSS (the three dimensions) “fairly well” or “thoroughly” increased from 36 percent in 2014–15 to 98 percent in 2017–18; those indicating “thorough” understanding increased from 2 to 32 percent. Further, while only 2 percent of

Teacher Leaders “thoroughly” understood “the shifts in pedagogy required to teach the NGSS” in 2014–15, this increased to 10 percent in 2015–16 and to 29 percent in 2017–18. A similar trend was true of Core Teacher Leader understanding, and the most dramatic increases for both groups were evident at the end of their first year of participation.

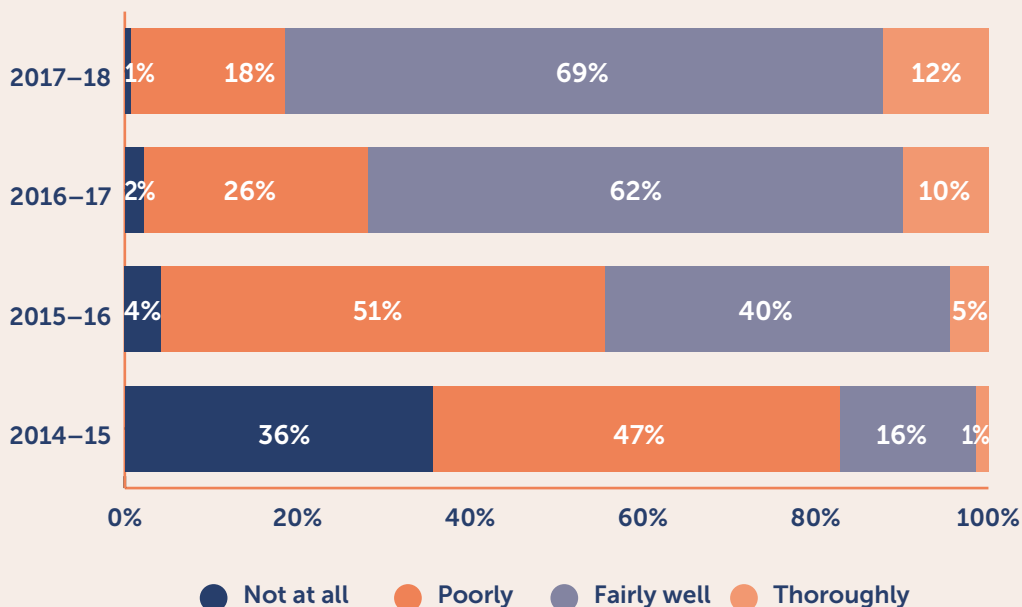
Surveyed Early Implementer teacher leaders also gained understanding of how to help other teachers transition to the NGSS. As shown in Figure 2, during the year prior to joining the Initiative (2014–15), Teacher Leaders reported that they felt unprepared. That is, 83 percent understood how to help other teachers transition to the NGSS “not at all” or “poorly.” However, by the 2017–18 school year, 81 percent understood it “fairly well” or “thoroughly;” only 1 percent said that they understood “not at all,” and 18 percent understood “poorly.”

For the Core Teacher Leaders, who had joined the Initiative one year earlier and benefited from more intensive professional learning, survey data showed even greater gains in understanding.

⁹ Survey results represent data from the eight participating school districts; data from the two participating charter management organizations are not included.

Figure 2. Teacher Leader understanding of how to help teachers transition to the NGSS over four years

How well would you say you understand the steps involved in helping teachers transition to NGSS?



Source: Teacher Leadership Survey, administered by WestEd in spring 2015 (N=392), spring 2016 (N=358), spring 2017 (N=303), and spring 2018 (N=253).

For example, by the 2017–18 school year, only 4 percent of Core Teacher Leaders indicated understanding “poorly” and none indicated “not at

all.” See Appendix D for more survey results relating to teacher leader understanding.

Additional Leadership Preparation

By the end of their first year in the Initiative, teacher leaders were well on their way to having the knowledge of the NGSS that they would need to assist other teachers in beginning to implement the new standards. But that is not all that teacher leaders had gained — they had also witnessed effective leadership and participated in professional learning that encouraged collaborative innovation and risk taking, and that provided skills and knowledge for effecting change in their school districts. Remarks by an elementary school principal illustrate the knowledge and skills that teacher leaders gained:

I see the confidence [in teachers] has grown — not only in understanding science content, but being a Teacher Leader and presenting, facilitating, and taking initiative. They've had to present to each other, and present on district learning community days. And they're very collaborative — if they don't know the answer, they don't shut down. They take risks. They have a growth mindset as a result of the grant. (Elementary school principal)

This section discusses the ways that the Initiative prepared both Core Teacher Leaders and Teacher Leaders, with an emphasis on:

1. Creating a culture of belonging and safety in all contexts of the Initiative
2. Preparing change agents who can clearly communicate about the NGSS to stakeholders

and work at creating school and district contexts that support implementation

3. Identifying specific leadership opportunities for teachers and partnering with them as they step into these opportunities

Establishing a Collaborative Culture and Active Support

No One Takes on a Challenging Task Alone

A key to the success of the Initiative has been the support built into every step taken by Teacher Leaders. When Teacher Leaders were given their first leadership responsibilities at events such as districtwide professional development days, none were asked to do anything completely on their own. They planned and presented professional learning sessions in pairs, typically with a Regional Director, Project Director, or Core Teacher Leader in attendance as backup — to answer any questions beyond the understanding or experience of the presenters.

Empowering Teachers to Be Change Agents

During the Initiative, teacher leaders found that they were being called upon to explain the NGSS and the Initiative to administrators, parents,

and even reporters. Consequently, both groups of teacher leaders received training from the Initiative in how to communicate the importance of science instruction and the NGSS. During Summer Institutes, Teacher Leaders learned how to craft a succinct and persuasive message.

Core Teacher Leaders received even more intensive professional learning related to being change agents in their districts. For example, during the annual January and June Core Leadership Team professional learning sessions, Core Teacher Leaders:

- Learned about their own leadership styles
- Learned strategies to deal effectively with resistance
- Received intensive communication training from Achieve
- Learned how to effect system changes needed for NGSS implementation, based on guidance from "The Change Game" (Hergert, Mundry, Kolb, Rose, & Corro, 2003)

A full day of professional learning was devoted to "The Change Game," an activity that provided insight into school district systems and mechanisms with the goal of enabling participants to be agents for creating changes needed for teachers to teach the NGSS. During the game, groups of players tried to determine what combination of activities would benefit the largest number of people on their game board, which included administrators, teachers, and parents. The game and its rules are set up to clarify the importance of building key relationships at school sites, with parent groups, or in school boards prior to making large, expensive schoolwide or districtwide strategic moves. A critical takeaway for participants was that change takes longer than expected and requires an unexpected number of people to be on board.

Providing Leadership Opportunities

The Initiative believes in teachers until teachers believe in themselves. (Regional Director)

Soon after their introduction to the NGSS at their first Summer Institute, Core Teacher Leaders were offered the responsibility of leading sessions about the standards for the new Teacher Leaders at the following Summer Institute. And, in turn, Teacher Leaders were challenged to advocate for science in their schools during their first year. Through the Initiative, teacher leaders first gained knowledge, and then were invited to take on leadership roles through which they developed skills in communication, presentation, facilitation, and mentoring. This was stressful, as the challenges often were presented before teachers felt ready. However, the Initiative's stance, articulated by a Regional Director, that "the authentic work of taking [on] risks with co-presenters is what builds expertise over time" led most teacher leaders to report that they felt supported and therefore were able to be feel successful. The result was that teacher leaders developed confidence and were increasingly willing to accept and even seek out subsequent leadership opportunities.

Leadership in Action

At first, both groups of teacher leaders were not themselves aware of how much they had learned and how well they could instruct others. However, they were game for stepping into leadership roles, because they felt supported by the Initiative and could lean on each other. In most Early Implementer districts, Project Directors reported that 90 percent to, in some cases, 100 percent of Teacher Leaders were actively spreading the NGSS to others in their districts after two years of participation.¹⁰

The leadership activities that teacher leaders engaged in took a variety of forms:

- Providing formal professional learning about the NGSS to teachers in their districts
- Providing more tailored assistance to individuals or small groups in their districts
- Shining a light on NGSS implementation for teachers outside the Early Implementer districts, through activities such as conference presentations

Providing Professional Learning

On Tuesday, [after presenting] at the Institute, I shared with a teammate that I felt so energized, I felt like I was in my element, I felt like I was home!! I never thought I would say something like that about science!! We have come a long way. (Elementary-level Core Teacher Leader email to teammates)

“This grant has helped me not only grow as a secondary science educator, but I’ve grown as a presenter and a resource for preparing our elementary school teachers in teaching NGSS science lessons to their students. I’m grateful for being an Early Implementer of the NGSS.” (Core Teacher Leader)

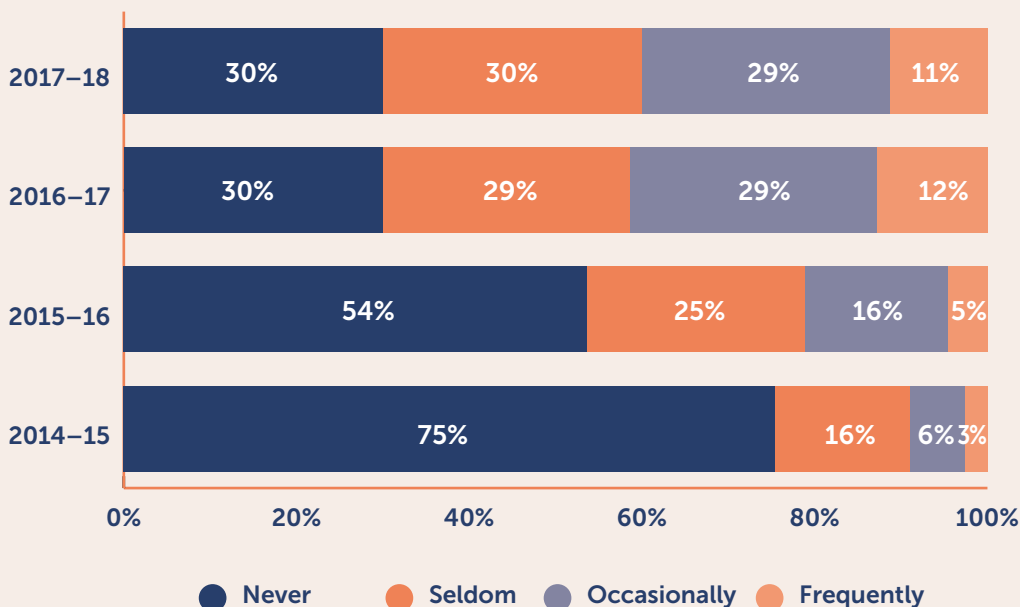
The majority of teacher leaders in the Initiative had planned and/or delivered a formal presentation in their district by the end of the 2017–18 school year, and some had delivered dozens. Survey responses indicate that the overall number of presentations delivered by teacher leaders steadily increased for the first two years of Teacher Leader participation and the first three years for Core Teacher Leaders. For instance, as shown in Figure 3, during the year prior to joining the Initiative, 75 percent of Teacher Leaders reported “never” making a presentation at their school, and less than 10 percent “frequently” or “occasionally” did so. By the 2016–17 school year, 70 percent of Teacher Leaders had made at least one formal presentation at their school during the school year, and 40 percent reported doing so “frequently” or “occasionally.” Teacher Leaders and Core Teacher Leaders were also asked how often they formally presented at their district, and those data reveal similar trends. See Figure D6 for more data related to this survey question.

Survey data reveal a slight drop-off in formal presentations, particularly at the district level,

10 Source: Interviews with Project Directors, conducted by evaluators in November 2017.

Figure 3. How often Teacher Leaders formally presented about NGSS implementation at their schools during the four years of the Initiative

How often did you formally present about NGSS implementation to others at your school?



Source: Teacher Leadership Survey, administered by WestEd in spring 2015 (N=386), spring 2016 (N=345), spring 2017 (N=367), and spring 2018 (N=300).

in 2017–18 compared to 2016–17. This reflects an overall change in Initiative priority due to changed teacher need.¹¹

In the first four years of the Initiative, Core Teacher Leaders and Teacher Leaders delivered hundreds of presentations at Early Implementer and district events, and beyond. This section describes how teacher leaders have shared their expertise in the following contexts:

- Early Implementer Summer Institutes
- Teaching Learning Collaboratives
- District professional learning events

- Administrator meetings
- School staff meetings
- Family science nights

Presenting at Summer Institutes

At the first Summer Institute, Core Teacher Leaders participated in sessions led by Project Directors and K–12 Alliance Regional Directors on such topics as the architecture of the NGSS, notebooking, developing and using models, and engaging in argument from evidence. The following year, Core Teacher Leaders led some of these

¹¹ By 2017–18, many non-Early Implementer teachers were familiar with the NGSS and ready for more tailored instruction. In some locations, particularly smaller districts, this trend in the data may also be due to a saturation effect. That is, there were not enough venues or opportunities for making more presentations than the previous school year. Core Teacher Leader data show a slight increase in formal presentations at the school level in 2017–18, likely reflecting the fact that these leaders were beginning to visit schools where there were no Early Implementers teaching and that had until then not participated in NGSS-related professional learning activities.

sessions at the second Summer Institute, which was the first exposure to the NGSS for the larger set of Teacher Leaders. Armed with the scripts and slides from the previous year, with a Project or Regional Director in the room to answer any questions they couldn't, the Core Teacher Leaders presented in teams of two to breakout groups of 30 Teacher Leaders. For many Core Teacher Leaders, it was the first time they had ever instructed adults. To their own surprise, they were able to explain the standards, as illustrated by this comment:

We were so nervous about presenting and if someone asked a question. People did ask questions, but we actually had answers. We could tell them what we did and what our students did. We actually knew what we were talking about!
(Elementary school Core Teacher Leader)

Also, the Core Teacher Leaders could recount personal experiences from the classroom, which lent authenticity to their presentations and tailored the content to their audience. By the end of the fourth year of the Initiative, Teacher Leaders were Implementer peers at the districts' local Summer Institutes.

For the pedagogy sessions, we wrote the scripts and created the PowerPoints and our Teacher Leaders are going to be doing it. So we trained them in May, and they're leading the pedagogy sessions and they're doing a fantastic job. (Core Teacher Leader)

Facilitating Teaching Learning Collaboratives

The Teaching Learning Collaboratives (TLCs), the Initiative's lesson studies, were initially facilitated by Project Directors and Regional Directors. Starting in the second year, a small number of Core Teacher Leaders "shadowed" the facilitators and began to take on facilitator roles. By the third year, Core Teacher Leaders were shadowing or facilitating during almost half of all TLCs. In year four, 80 percent of TLCs had Core Teacher Leader facilitators, sometimes with a Project or Regional Director in attendance as backup to ensure all steps were followed with fidelity.

Presenting at District Professional Learning Events

Both Core Teacher Leaders and Teacher Leaders have led NGSS sessions for their peers at districtwide professional learning events. In keeping with the guidance of the Initiative's leadership, each session was led by a pair of presenters, sometimes a Core Teacher Leader and a Teacher Leader, and at least one additional Early Implementer participant would provide assistance. Typically, an Initiative leader, such as a Project or Regional Director, would also be in the room; or, at larger events with multiple concurrent NGSS sessions, the Initiative leader would circulate to be available to address questions beyond the knowledge of the presenters.

Presenting at Other District Events

In district meeting discussions, teacher leaders have been able to bring other teachers along by sharing their understanding of the NGSS. For example, during the process of instructional materials adoption for grades 6 through 12, Early Implementer middle school teacher leaders in

one district were able to help the high school teachers understand important criteria for materials selection:

Just last Monday, the secondary director of curriculum instruction and I had a team of about 25 different teachers, counselors, and a couple administrators. I think all 10 of the middle school representatives that were there have been at one or more of our Summer Institutes and participated in a lesson study. And they were actually teaching the high school people about some things that needed clarification, which was really neat. So it wasn't me doing it, it wasn't the district administrator, or the director of curriculum doing it. It was the early implementers. One Core Teacher Leader is in that group, and the rest of them are Teacher Leaders. It was really powerful. (Project Director)

In some districts, teacher leaders also attended and presented at administrator meetings. For example, one Project Director was able to get on the agendas of districtwide principal meetings for up to 90 minutes, four times per year. Typically, he included hands-on activities to demonstrate NGSS three-dimensional instruction. At one of these sessions, observed by an evaluator, he was accompanied by five Core Teacher Leaders. The focus was on how teachers can facilitate high-quality academic discussion in the classroom. The entire group, including the superintendent, carried out an investigative activity and then talked about it. The Core Teacher Leaders contributed valuable firsthand experience from their classrooms. One elementary school Core Teacher Leader explained to the group:

The math teacher was doing volume, but the kids weren't getting it. . . . So we did a displacement activity with baseballs in the water — they observed, and drew, and talked, over multiple days. By the time we were finished, they had it down. When they took the math test, they talked about science. It was getting to apply it — not just getting it from a book.

After the meeting, another Core Teacher Leader remarked:

I heard the Superintendent say, "How do we make the other subjects as interesting [as science]?" Then, when we talked about how science can be a way to teach ELA and math, I heard him say "Oh!" They saw that rather than subjects being separate, they're integrated.

Presenting at School-Level Events

At the school level, many Early Implementer teachers presented NGSS information at staff meetings, not only in their own schools, but in schools where there were few or no teacher leaders. Teacher leaders were sometimes given the floor to make "a two-minute presentation about how awesome science is, and that we're there to help," as one Core Teacher Leader explained. In some districts, a "menu" of NGSS courses was offered to all schools in the district, and principals were invited to request a presentation for the school staff on a given topic. These sessions were typically prepared by Core Teacher Leaders and modified for different windows of time.

Teacher Leader presents hands-on science lesson at faculty meeting

One elementary school principal wanted all her teachers to have a short but deep introduction to NGSS teaching and learning. On an early-release-day afternoon in the spring, the principal required all faculty to experience a science lesson led by the Initiative's Teacher Leader in her school. A WestEd evaluator on hand observed that the principal attended the entire 90-minute session and made supportive opening comments.

The Teacher Leader adapted an investigation of human reaction times from "Mystery Science," a supplemental curriculum of hands-on science lessons purchased by the district; the lesson was adapted because the product has some NGSS-consistent features but not others. From a show of hands, the Teacher Leader learned that most faculty still had never looked at this resource for lessons, even though it had been available all school year and had been recommended to them several times.

At the very beginning of the session, even with the principal on hand and making supportive comments, there were several vocal skeptics saying such things to the Teacher Leader as, "You can do this, but the rest of us never could do it." The Teacher Leader was very adept at facilitating, both in addressing these remarks and in being able to still move the lesson activities forward.

The tide turned once the teachers were about one-third of the way through the lesson. The evaluator could see the teachers who had been nervous or resistant becoming involved. By the end, people were making comments such as, "I can see how this is good for students to do," and, "I could do this, if you're available to help me a bit more." After the session, the Teacher Leader told the evaluator: "The opportunities the Initiative provided to shadow other facilitators prepared me for what happened today, or those reactions would have thrown me off."

The vignette above illustrates the value of leadership training received from the Initiative.

Holding Family Science Nights

A couple of Early Implementer districts have organized family science nights, which presented opportunities to inform parents about the NGSS.

We did family science night — I planned that, and [the Project Director] was there. Primary and upper grades simultaneously. I gave an overview [of the NGSS]

in the multipurpose room and we did breakouts after that. It was pretty well attended for being kind of last minute. We have 650 K–5 students total, and a couple hundred came. This was one of our Core Leadership Team goals, so parents can ask students, "How was your science?" We wanted to let them know the students are not just looking at a book. (Elementary school Core Teacher Leader)

Direct Assistance

At the end [of an investigative activity with resistant teachers], I said, “Isn’t it kind of neat, you guys, that when you first walked in and you said that you’re not very good at science and you said that you just want to know [the answer]. And now you are talking about friction and want to do it more, now that you’ve tried it?”
(Elementary School Teacher Leader)

Presenting to large groups of other teachers was appropriate in the beginning to meet widespread needs for basic NGSS information. Over time, however, individuals and small groups of teachers were ready for and requesting more tailored support from teacher leaders. And with more classroom practice, teacher leaders were ready to actively share their growing NGSS expertise with other teachers.

In interviews, all Early Implementer case-study teachers reported that they were engaged in sharing their NGSS knowledge with other teachers, particularly their grade-level site teams, with whom they coordinated lesson planning throughout the year.

Some Teacher Leaders reported discussing the NGSS during their professional learning community time; however, those at the elementary level reported that this happened infrequently. Interviewed elementary school case-study teachers explained that often English language arts and math were prioritized, and they had difficulty convincing the group to spend time on science.

Certain teacher leaders became known as resources in their schools and districts, as

described by this International Baccalaureate (IB) Teacher Leader:

I have teachers come [to me for help], it seems like quite frequently, especially when they’re writing out the student plans, which we call IB units. Sometimes [teachers] will come [to me] and say . . . We’re trying to get on board with the NGSS but we don’t have these materials. What can we use instead?” . . . I help them read through the actual disciplinary core ideas or connect the crosscutting concepts with our key [IB] concepts. (Elementary school Teacher Leader)

The vignette on the following page provides an example of Teacher Leader direct assistance to peers in teaching a science unit.

Survey data show that teacher leaders discussed NGSS implementation increasingly often over the course of the Initiative. For example, as shown in Figure 4, the percentage of Teacher Leaders who reported sharing ideas with colleagues “frequently” or “occasionally” jumped from 36 percent in 2014–15 to 74 percent in 2015–16, then continued to increase over the next two years, to 86 percent in 2017–18. See Appendix D for more survey data related to teacher leaders sharing NGSS implementation ideas with colleagues.

Teacher Leaders also shared information about the NGSS when interacting with non-Early Implementer teachers in other contexts.

Teacher Leader collaborates with peers to co-teach an engineering unit

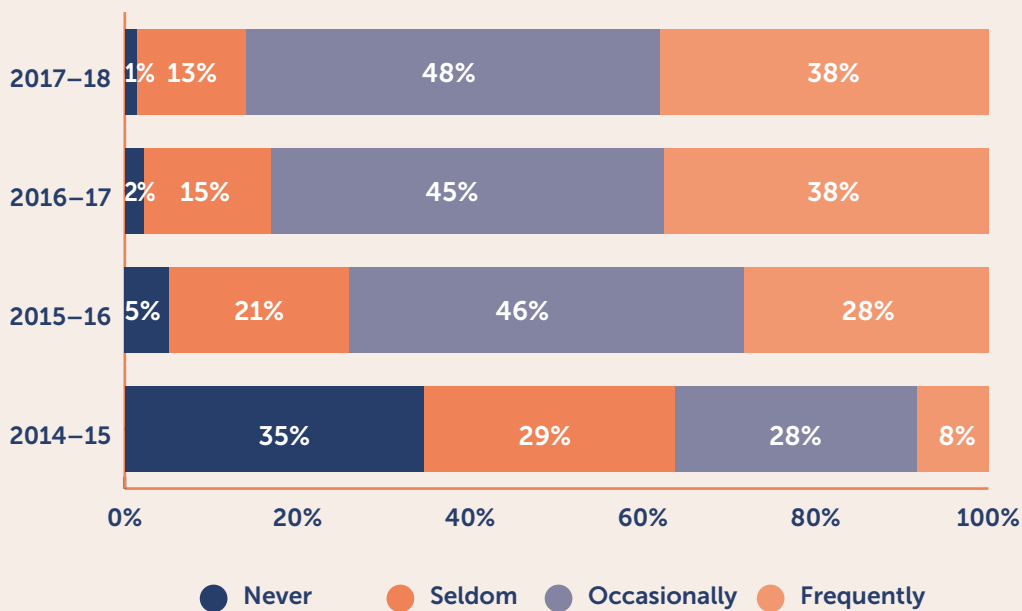
A WestEd evaluator observed two sessions of an engineering unit being taught over the course of a week by a grade 2 Teacher Leader during science time each day. Pairs or trios of students were excitedly designing, building, and testing small models of a wall made from everyday materials (e.g., stones, sand, water). The investigation focused students on how different kinds and proportions of materials affect their walls' strength (i.e., exploring the NGSS crosscutting concept of structure and function).

The evaluator noticed that other teachers were popping into the room at times. During

interviews, it surfaced that the Teacher Leader had enlisted her school's other grade 2 teachers to also teach this unit. They planned together before teaching the unit and were debriefing a few minutes each day about how things went while the unit was underway. Teachers' classrooms were located next to each other, so they could see how things transpired in the Teacher Leaders' classroom before they did the same activity in their own classroom later in the day. Although one of the teachers didn't do the whole unit, seeing how her students were learning from the sessions made her want to do the entire weeklong unit next year.

Figure 4. Frequency with which Teacher Leaders shared NGSS instructional philosophies, strategies, and/or ideas with colleagues during the four years of the Initiative

How often did you share NGSS instructional philosophies, strategies, and/or ideas with colleagues at your school?



Source: Teacher Leadership Survey, administered by WestEd in spring 2015 (N=385), spring 2016 (N=352), spring 2017 (N=367), and spring 2018 (N=300).

This year I invited our new special ed teacher to come in and watch as I delivered a piece of one of my lessons. She had a lot of misconceptions, I believe, about the abilities of her students and the importance of science. So, I invited her to come in . . . and really watch how I presented the lesson to my students and how very few materials I needed and how rich the experience was for everybody . . . It happened once, but I am constantly trying to feed her information, trying to explain to her that, especially with her special ed kids, even though their reading level and comprehension levels are so low and so varied, that this would be an amazing way to incorporate informational learning in a science context. (Elementary school Teacher Leader)

Being a Lighthouse Beyond the Early Implementer Districts

Early Implementer teachers have had many more opportunities to learn about NGSS implementation than most other California teachers of science, and they have a great deal to teach others. As part of the Initiative, participating districts were charged not only with involving every one of their science teachers in NGSS training, but also with acting as “lighthouse districts” for the entire state by sharing lessons learned with educators in non-Early Implementer districts and in science education organizations and agencies. The K–12 Alliance Executive Director and Regional Directors and district Project Directors were primarily responsible for interacting with these outside organizations and districts. However, by year three of the Initiative, there was an increase in participation by both Core Teacher Leaders and Teacher Leaders who engaged in lighthouse activities in three main ways: they disseminated information at convenings (e.g., conferences), hosted visitors in their classrooms, and /or provided resources to educators outside their district, either directly (e.g., emails, phone calls) or indirectly (e.g., posting information online). For more information about how teacher leaders have acted as ambassadors beyond their districts, see Appendix E.

Impact of the NGSS on Teacher Professional Growth

Teacher leaders benefit from ongoing intensive professional learning, resulting not only in deeper understanding of the NGSS, but also in the following professional gains:

- Gaining understanding of and experience with how to effect change in a school district
- Developing skills in delivering professional learning
- Meeting and working with state and, in some cases, national leaders in science and science education

Evaluators noted multiple instances of job promotions and other professional growth on the part of Early Implementer teachers. Some of these career moves may not be directly attributable to participation in the Initiative, but some of these teachers have explicitly credited their experience in the Initiative. This section presents examples, rather than an exhaustive list, of the many professional advancements made by teacher leader participants in the Early Implementers Initiative.

Advancing Within the Initiative

The position of NGSS Early Implementer district Project Director requires skills in strategic planning, public speaking, pedagogy, planning and

delivering professional learning to teachers and administrators, project management, budgeting and accounting, report writing, lobbying district leadership for science support, and more. By the end of the fourth year of the Initiative, eight Core Teacher Leaders (two elementary schools and six middle school) had taken over Project Directorships vacated due to Project Directors retiring, transitioning to different positions, being reassigned in the district, or moving out of the district. All of these individuals were classroom teachers who left the classroom to direct districtwide NGSS implementation. Similarly, some Teacher Leaders joined their districts' Core Leadership Teams when vacancies became available.

Advancing Within the District

Through their participation in the Initiative, teacher leaders have come to see themselves differently, capable of making additional contributions both within and beyond STEM, which has inspired changes in some individuals' career paths and professional roles. For instance, during their tenures as Core Teacher Leaders, some individuals left the classroom to take on district-level positions. These include:

- One Core Teacher Leader moved into a STEM coordinator position at the district level and

cited the work of the Initiative in helping her develop several leadership skills. Another Core Teacher Leader in the same district worked as the Early Implementer district Project Director for a short while before becoming the STEM director for the district, a new position merging the math and science departments.

- A grade 5 Core Teacher Leader became a teacher on special assignment in professional learning. Her district Project Director explained, “I know part of the reason that she was seen as a prime candidate was because . . . they saw her as having a double set of skills, math and science. And knew that she could be an asset to support work in math and in science.”
- Several teacher leaders have begun master’s programs, and some explicitly reported that their decision was due at least in part to their Early Implementer experience. One Core Teacher Leader had always intended to get a master’s degree but decided to work toward her administrator credential because she wanted to advocate for science at the elementary level. Ultimately, she would like to work at the district level in Curriculum and Instruction.
- A recently retired Core Teacher Leader has begun to build her own brand and consultancy work. As the district Project Director explained, “She is doing a lot more with what she’s passionate about, which is climate change. But she’s said that because of the kind of leadership development that the Core Leadership Team provided, that she has the confidence to do that. . . . Now, she goes to the annual California Science Education Conference and presents, and she’s just reaching out a lot more to offer her insight and her services, and she might not have done that without this Initiative.”

Beyond the District

Several teacher leaders have participated in and presented at state- and even national-level education convenings:

- Three Core Teacher Leaders have been elected to the board of directors of the California Science Teachers Association.
- Twelve Early Implementer teacher leaders (nine Core Teacher Leaders and three Teacher Leaders) from four districts were trained in the spring of 2017 to participate as California State Science Instructional Materials Adoption Reviewers in 2018.
- Three Early Implementers, including one current Core Teacher Leader and two Project Directors who had been classroom teachers (one until 2016, the other until 2017), joined Achieve’s Peer Review Panel, described as, “An elite cohort of educators from across the country with expertise in the NGSS and the [EQuIP Rubric for Science](#) that reviews lessons and units to determine the extent to which they are designed for the NGSS.”¹²
- Several teacher leaders have had a role in developing grade-level learning sequences that have been submitted by the K–12 Alliance to Achieve’s Peer Review Panel and were presented at the California Science Education Conference.
- Teacher leaders presented with professional scientists as part of the California Science Education Conference Climate Summit in November 2018.

When asked in an interview how the Initiative has affected the professional growth of teacher

¹² For information about Achieve’s Peer Review Panel, see <https://www.nextgenscience.org/peer-review-panel/peer-review-panel-science>

leaders, a newly appointed Project Director articulated:

Myself, I'm an example. I never thought I'd be doing any of the things I'm doing.¹³ So it's been big with me. [Our district's Core Teacher Leader] is now on the board of directors of CSTA. I had one Teacher Leader who co-presented at the last learning sequence we did last month, and that was her first time presenting at all, so she was really excited about starting to do that. I'm seeing a lot of that actually.

¹³ This grade 2 teacher, turned Core Teacher Leader, turned district Project Director, has engaged in the following leadership activities outside the district since joining the Early Implementer Initiative: invited presenter for Achieve's national business and education leaders conference, California science community of practice, Curriculum and Instruction Steering Committee (CISC) science leaders, county district science leaders network, writer and trainer-of-trainers for state NGSS rollouts 4 and 5, lead writer for rollout 6, member of Achieve's Peer Review Panel, CA NGSS TIME (toolkit for instructional materials evaluation) writer and trainer, Member of Achieve's NextGen TIME National Network, Regional Director on the California Science Teachers Association (CSTA) board of directors, author of published articles in CSTA's California Classroom Science. Within-the-district activities have included meeting one-on-one with every K–8 principal, connecting with informal science educators on environmental education, and conducting classroom walk throughs with principals throughout the district.

The top of the page features a yellow banner with a pattern of small, faint science-related icons such as a microscope, beaker, and DNA helix.

The Early Implementers Initiative Moving Forward

As all of the Early Implementers Initiative evaluation reports attest, making the substantial transition to full implementation of the NGSS takes time. Originally slated to be a four-year effort, a two-year extension of the Initiative was approved in 2018, extending support through the 2019–20 school year. Teacher Leaders will have expanded

roles in spreading the NGSS to all teachers who are less familiar with the standards, including, in some districts, partnering with school principals to plan and coordinate NGSS professional learning at all K–8 sites in their districts. The role of administrators is crucial to NGSS implementation, as described in earlier evaluation reports.

Recommendations for Administrators

The Early Implementers Initiative has made progress on its goal of leveraging teacher leadership to maximize the number of teachers willing and able to transition to teaching the NGSS. In fact, at an annual roundtable of Early Implementer district superintendents,¹⁴ participants remarked on the potential value of using a similar strategy for future districtwide transitions.

In many ways, administrators hold the key to nurturing or stifling the growth of teacher leadership. To encourage and leverage teacher leadership in support of NGSS implementation, evaluators present the following recommendations for district- and site-level administrators:

- **Acknowledge that the NGSS are a big change for teachers.** First and foremost, understand what it takes to get teachers up to speed to teach the NGSS. These standards represent a substantial and fundamental departure from previous pedagogy.
- **Plan for a multi-year ramp-up.** Regardless of the level of effort, a multi-year transition is required. One year, even with intensive training, is not enough.
- **Create a cohort of teacher leaders.** Invest in intensive training for a subset of teacher trainers/leaders throughout the district and at

all grade levels. Teachers have credibility and understand the needs of their peers. Further, having a cohort of teacher leaders throughout the district builds in long-term support for change.

- **Focus on peer leadership abilities.** Don't assume that your strongest teachers will be effective professional learning providers. Teaching adults is different from teaching children. Teacher leader preparation should include guidance about leadership, rather than only focusing on the NGSS.
- **Make teacher group work a priority.** Not only do teachers need more than a few professional learning sessions, they need time to collaborate with each other on an ongoing basis to figure out the NGSS, plan lessons, and compare outcomes. Release time for such group work can only be gained with administrator support.
- **Help teacher leaders grow.** Once teacher leaders have acquired experience and expertise, capitalize on and further develop their leadership capacity by giving them responsibilities and opportunities to share their learning with others (e.g., invite them to present to site staff). Seriously consider how they need to be supported in their early attempts at leading their peers.

14 Full-day roundtable meetings of district superintendents, assistant superintendents, K–12 Alliance staff, Project Directors, and S.D. Bechtel, Jr. Foundation Program Officers were convened in February 2016 (via webinar), February 2017 (in San Francisco), and March 2018 (in San Diego) for the purpose of discussing Early Implementers Initiative progress and plans.

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Appendix A. Survey Questions Used for This Report

Classroom Science Teaching Survey (Relevant Questions)

Answer options: 0–60 minutes, 61–120 minutes, 121–180 minutes, 181+ minutes, N/A

During the XX-XX school year, approximately how many minutes in a typical month did you collaborate with colleagues on science, outside of TLCs and other Early Implementer events, in each of the following contexts?

- Professional Learning Community (PLC):
- Professional Learning (PL) outside of district:
- District-wide Professional Learning (PL):
- School-wide Professional Learning (PL):
- Meeting with grade-level team or science department (e.g., Professional Learning Community/PLC)
- Informal collaboration (with other teachers or administrators):
- Science events at school or district (e.g., science fair or family science night)
- Working on another initiative or project (not Early Implementers)
- OTHER:

How much of your informal collaboration time on science during the 2017-2018 school year involved colleagues who ARE EII participants (Core Teacher Leaders, Teacher Leaders, Project Directors,

members of the Core Leadership Team, etc.) vs. those who are NOT EII participants? (Answers should be in percentages and total 100%.)

- EII Participants:
- Non-EII Participants:

Answer options: None, A little, Some, A lot, N/A

During the XX-XX school year, how much impact did the following have on your science instruction?

- Professional Learning Community (PLC)
- Interacting with other teachers (outside of PL)
- Interacting with school administrators (outside of PL)

Teacher Leadership Surveys (Relevant Questions)

How well would you say you understand the following?

- The structure of NGSS (the three dimensions)
- The Science and Engineering Practices (SEPs) within NGSS and how they are used during instruction
- The Crosscutting Concepts (CCCs) within NGSS and how they are used in instruction
- The Disciplinary Core Ideas (DCIs) and how they are used in instruction

- NGSS engineering design and how students engage in it
- The 5 Es for designing lessons: Engage, Explore, Explain, Extend, Evaluate
- Using science notebooks specifically for student sense-making
- Looking deeply and systematically at students' science work with colleagues
- Using questioning strategies (e.g., teacher-to-student, student-to-student discourse) to elicit student thinking
- Using Claim, Evidence, and Reasoning (CER) to advance student thinking
- The use of phenomena to drive science instruction
- The shifts in pedagogy required to teach the NGSS
- How NGSS relate to the Common Core State Standards for ELA
- The development of conceptual flows or story lines for instruction
- How to address more than one science discipline (i.e., earth/space, life, physical) in a science unit
- How to address environmental education in a science unit
- How to help teachers implement the NGSS

Answer options: *Never, Seldom, Occasionally, Frequently*

During the XX-XX school year, how often did you do the following things at your SCHOOL? (Note that all of the following refer to teaching in general, rather than science specifically.)

- Voiced your personal thoughts about teaching or learning with other teachers at your SCHOOL
- Assisted another teacher who specifically asked for or needed support at your SCHOOL
- Worked with other teachers to solve a problem at your SCHOOL (beyond just your class)

- Took an action that increased parent participation at your SCHOOL
- Complimented or thanked another teacher for work done to improve the SCHOOL
- Asked another teacher at your SCHOOL for advice or help with a teaching problem you had
- Participated in a Teacher Learning Collaborative (TLC) at your SCHOOL about subjects OTHER than science

During the XX-XX school year, how often did you do the following things at your SCHOOL? (The following refer to teaching in general, unless science is specified.)

- Took time out to help a teacher deal with instructional or curricular changes at your SCHOOL
- Met with a teacher to improve his/her practices to meet SCHOOL goals
- Spoke out on behalf of students at your SCHOOL whose needs weren't being met
- Played an "official" leadership role within your SCHOOL (e.g., mentor, instructional coach, etc.)
- Took an action with the goal of increasing the success of all the students in science at your SCHOOL
- Played an important role in building the professional community at your SCHOOL

Answer options: *Never, Seldom, Occasionally, Frequently*

During the XX-XX school year, how often did you do the following things at your DISTRICT (outside of your school)? (All of the following refer to teaching in general, rather than science specifically.)

- Voiced your personal thoughts about teaching or learning with other teachers in your DISTRICT (outside your school)
- Assisted another teacher who specifically asked for or needed support in your DISTRICT (outside your school)

- Worked with other teachers to solve a problem in your DISTRICT (outside your school)
- Took an action that increased parent participation in your DISTRICT (outside your school)
- Complimented or thanked another teacher for work done to improve the DISTRICT (outside your school)
- Asked another teacher in your DISTRICT (outside your school) for advice or help with a teaching problem you had
- Played an important role in building the professional community at your SCHOOL
- Participated in a Teaching Learning Collaborative (TLC) in your DISTRICT (outside your school) about a subject other than science

During the XX-XX school year, how often did you do the following things at your DISTRICT (outside of your school)? (All of the following refer to teaching in general, rather than science specifically.)

- Took time out to help a teacher deal with instructional or curricular changes in your DISTRICT (outside your school)
- Met with a teacher to improve his/her practices to meet DISTRICT goals
- Played an "official" leadership role (e.g. mentor, instructional coach, etc.) within your DISTRICT (outside your school)
- Played an important role in building the professional community in your DISTRICT (outside your school)

During the XX-XX school year, how often did you do the following things at your SCHOOL?

- Shared instructional philosophies, strategies, and/or ideas related to NGSS with colleagues at your SCHOOL
- Shared challenges associated with NGSS implementation with colleagues at your SCHOOL
- Helped to establish a safe environment to discuss opinions, beliefs, and knowledge related to NGSS at your SCHOOL

- Met with other teachers at your SCHOOL to reflect on their practice to help them better meet the vision of NGSS
- Played an important role at your SCHOOL in building a professional community devoted to the vision of NGSS
- Formally presented about NGSS implementation to others at your SCHOOL (e.g., school meeting)
- Formally presented about NGSS to parents or the community

During the XX-XX school year, how often did you do the following things in your DISTRICT (outside of your school)? (This question does NOT refer to the project TLCs.)

- Shared instructional philosophies, strategies, and/or ideas related to NGSS with colleagues at your DISTRICT (outside of your school)
- Shared challenges associated with NGSS implementation with colleagues in your DISTRICT (outside of your school)
- Helped to establish a safe environment to discuss opinions, beliefs, and knowledge related to NGSS in your DISTRICT (outside of your school)
- Met with other teachers in your DISTRICT (outside of your school) to reflect on their practice to help them better meet the vision of NGSS
- Played an important role in your DISTRICT (outside of your school) in building a professional community devoted to the vision of NGSS
- Formally presented about NGSS implementation to others in your DISTRICT (outside of your school) (e.g., district meeting, professional learning, etc.)

Are there any other leadership opportunities you have had as a direct result of your participation in the Early Implementers Initiative? If yes, please explain.

Appendix B. Interview Questions Used for This Report

CA K-8 NGSS Early Implementation Initiative Evaluation: Case Study Teacher Interview #2 (End of Year) Protocol: June 2017

1. Have you taken on any leadership roles since the EII started (both as part of the EII and outside of it)?
 - a. If so, please describe.
2. Have you noticed any spread in NGSS implementation among teachers at your school who are **not** part of the initiative?
 - a. Were you involved in helping these teachers implement NGSS? If so, how?
1. Have you helped in planning or presenting at any NGSS professional learning events since the EII started (or do you have plans to do this in the future)?
 - a. What was your role in the event (e.g., presenter, co-presenter, planner)?
 - b. Was the event for your district or school or something else?
 - c. Who was the main audience (e.g., all teachers, a specific grade level, administrators)?
 - d. What was the intended outcome of the event? Do you know if it was achieved?
2. Have you taken on any other leadership roles since the EII started (both as part of the EII and outside of it)?
 - a. If so, please describe.

CA K-8 NGSS Early Implementation Initiative Evaluation: Case Study Teacher Interview #3 (Fall 2017) Protocol: Nov–Dec 2017

Part 2: Teacher Leadership

This next set of questions asks about leadership activities that you have engaged in and their impact on other teachers.

3. Would you say that your participation in the Early Implementers has affected your career trajectory in any way? If yes, how so?
4. Since last school year, have you engaged in any kind of collaboration with other teachers where you are sharing your knowledge about NGSS (e.g., PLCs, School-wide meetings, informal collaboration)?
 - a. How has this affected the implementation of science in your or other teachers' classrooms? (Can you give me an example?)
5. Have you noticed any spread in NGSS implementation among teachers at your school who are **not** part of the initiative?
 - a. Were you involved in helping these teachers implement NGSS? If so, how?

CA K-8 NGSS Early Implementation Initiative Evaluation: Case Study Teacher Interview #4 (End of Year) Protocol: May/June 2018

1. Did you help plan any NGSS professional learning events this year? If yes:
 - a. Describe the event
 - i. Who and how many attended? (Teachers/admins? Grade level specific? District-wide?)
 - ii. What was the purpose of the event?
 - b. What was your role?
 - c. What new understanding, if anything, did you take away from this experience? It can be about NGSS, about planning or delivering professional learning, about your own leadership abilities, or anything else.
2. Would you say you have **informally mentored** any teachers about NGSS **this year**?
 - a. Who did you mentor? (EI/non-EI?)
 - b. What was the **context**? (How did it come about? Was it one-on-one? PLC? Content area team? Same school or different school? Out of the district?)
 - c. What did you help with? What was the **content**?
 - d. How, if at all, has this affected the implementation of science in your or other teachers' classrooms? (Can you give me an example?)
3. Did you **informally mentor** any teachers about NGSS **last year**?
 - a. How similar or different to the mentoring you did this year? (Or, if they didn't mentor this year: Who did you mentor last year and what was the context?)
4. What, if any, role do you have in your district's 2018 Summer Institute?

5. What, if any, role do you have in your district's plan for NGSS implementation in the 2018–2019 school year?
6. What other new leadership responsibilities have you taken on as a result of your involvement in the Early Implementers Initiative? (e.g., CSTA, reviewing instructional materials, LCAP)

K-8 NGSS Early Implementation Initiative: Project Director Interview #3 Protocol: March 2017

1. In your district, have TLs provided NGSS PD to their peers or has all such PD been provided by CTLs?
 - a. Did this take place in district-wide event(s)?
 - b. At their school sites (including during PLCs)?
 - c. Have all TLs done this at least once?
 - i. If yes, would you say a subset of TLs have volunteered to do this more than others?
 - ii. If no, is it because there were not enough opportunities available or because some have been reluctant to volunteer?
2. Are there EII teachers from your district who will be presenting about NGSS at CSTA in October?
 - a. What would you say about the meaning of this experience for them? (For example, was this new for them?)
 - b. Optional: For CTLs, how did it compare to presenting at the Summer Institute?
3. Another opportunity for leadership growth, especially for Core TLs, is the TLC. How do you think CTLs are doing in the role of TLC facilitator?
 - a. How did they prepare to facilitate?

b. Are all CTLs taking on this role?

i. If not, is it by choice or lack of opportunity to shadow/facilitate?

4. Are there any other activities that EII teachers from your district have done that provide evidence of leadership growth?
5. Have you, or any other CLT member, presented to the school board or other group of district leaders?

K-8 NGSS Early Implementation Initiative: Project Director Interview #4: November 2017

Part 5: Teacher leadership

1. What percentage of your TLs, would you say, are actively engaged in spreading NGSS to other teachers? **This is TLs only, not CTLs.**
 - a. Are they primarily collaborating with other TLs or expansion teachers?

K-8 NGSS Early Implementation Initiative: Project Director Interview #6: October 2018

Preliminary question #1: We're interested in how participating in the Early Implementers has impacted leadership of teachers in your district. Do you know of any anecdotes that are relevant to this line of inquiry? Are there any examples of how the Early Implementers has influenced the career trajectory of any teachers in your district that I may not be aware of?

K-8 NGSS Early Implementation Initiative: Regional Director Interview #4: January 2018

1. When we asked RDs and PDs what you most hoped the evaluators would notice, people talked about transformation. Where have you seen the greatest evidence of growth in teacher leadership amongst teachers, CTLs and/or TLs?
2. There have been many opportunities for Early Implementer teachers to develop leadership skills and experience. I'm thinking of activities such as being advocates for science in their schools and districts, presenting to their peers, and piloting lessons and/or instructional materials. In your observation, were these activities done by both TLs and CTLs?
 - a. Which opportunities to develop leadership skills and experience do you think have been the most important or impactful for **TLs** and why?
 - b. How about for CTLs and why?
3. How is the district strategically using the increased leadership capacity of CTLs and TLs? If they aren't, why do you think that is?
 - a. Who is most and least aware (Curriculum & Instruction, Supt, Science Dept., other)?
4. What conditions in the district will be most important to the continuation of this leadership?
 - a. Why? (Do these conditions support the spread of PD to all teachers?)
 - b. Are these conditions built into the district's proposal for years 5 & 6?
5. What advice about developing teacher leadership would you give to districts that are just beginning to implement NGSS?

Appendix C. Survey Response Rates

At the end of each school year, all teacher leaders were asked to complete two surveys, the Teacher Leadership Survey and the Classroom Science Teaching Survey, both of which ask about the recently completed school year. Core Teacher Leaders and Teacher Leaders took slightly different versions of the Leadership Survey, and both

groups took the same Classroom Science Teaching Survey. Each year, the total number of both groups of teacher leaders fluctuated slightly through attrition and recruitment to replace those who left. New Core Teacher Leaders were recruited from existing Teacher Leaders.

Table C1. Response rates for Teacher Leadership Survey, 2013–14 to 2017–18

Group surveyed	2013–14 N	2013–14 Response rate	2014–15 N	2014–15 Response rate	2015–16 N	2015–16 Response rate	2016–17 N	2016–17 Response rate	2017–18 N	2017–18 Response rate
Core Teacher Leaders	66	86%	70	81%	70	90%	65	100%	75	100%
Teacher Leaders	N/A	N/A	447	82%	399	80%	382	88%	330	69%

Source: Teacher Leadership Survey administered annually by WestEd.

Note: Baseline data for Core Teacher Leaders (i.e., 2013–14) were collected via a retrospective survey in spring 2015.

Table C2. Response rates for Classroom Science Teaching Survey, 2013–14 to 2017–18

Group surveyed	2013–14 N	2013–14 Response rate	2014–15 N	2014–15 Response rate	2015–16 N	2015–16 Response rate	2016–17 N	2016–17 Response rate	2017–18 N	2017–18 Response rate
Teacher Leaders and Core Teacher Leaders	N/A	N/A	N/A	N/A	384	82%	435	88%	418	78%

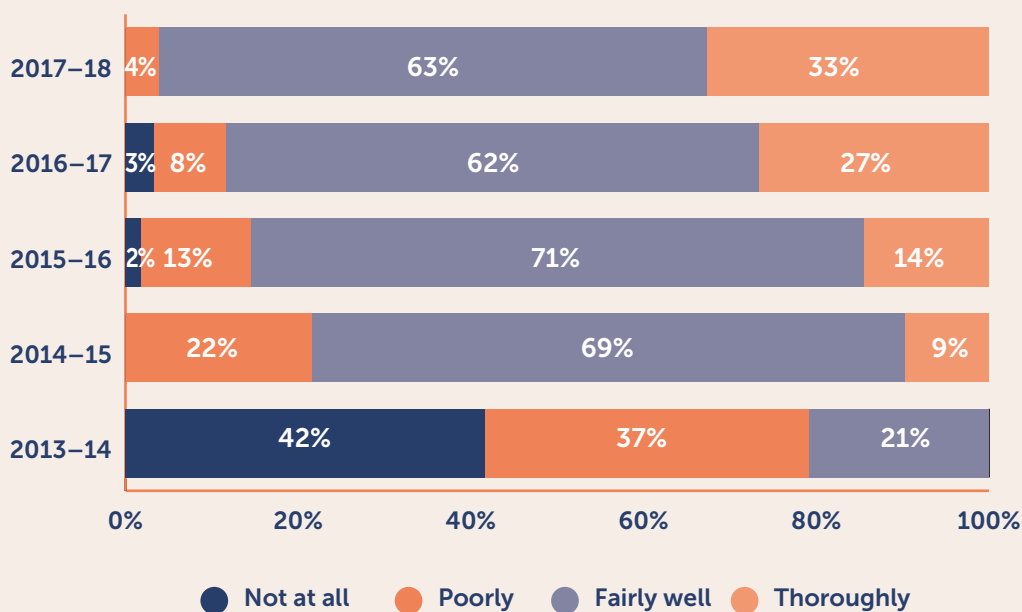
Source: Classroom Science Teaching Survey administered annually by WestEd.

Note: Most teacher leaders completed both surveys, but some did not, resulting in inconsistent Ns for the two surveys each year.

Appendix D. More Survey Results

Figure D1. Core Teacher Leader understanding of how to help teachers transition to the NGSS during the four years of the Initiative

How well would you say you understand how to help teachers implement the NGSS?

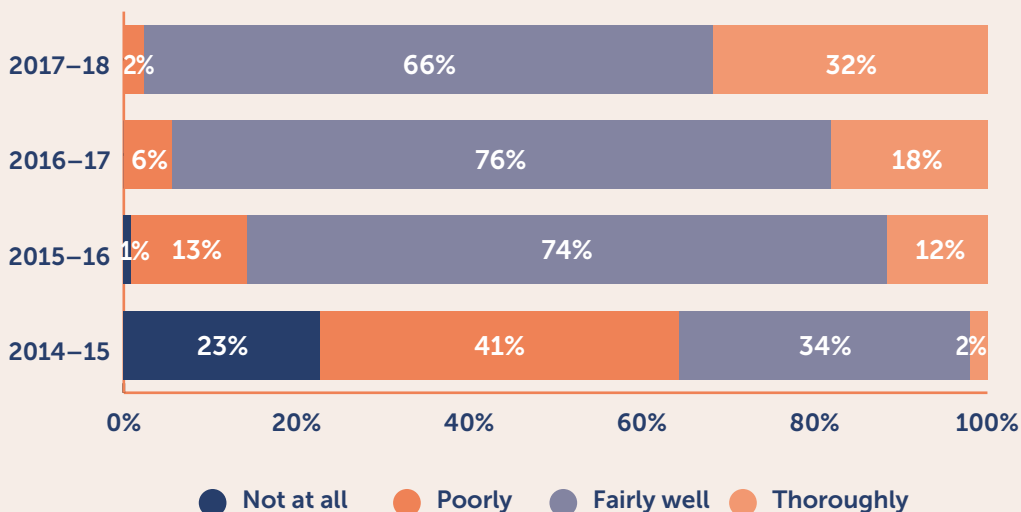


Source: Teacher Leadership Survey, administered by WestEd in 2013-14 (N=48), 2014-15 (N=51), 2015-16 (N=55), 2016-17 (N=60), 2017-18 (N=52).

Note: Baseline data for Core Teacher Leaders (i.e., 2013-14) were collected via a retrospective survey in spring 2015.

Figure D2. Teacher Leader understanding of the structure of the NGSS during the four years of the Initiative

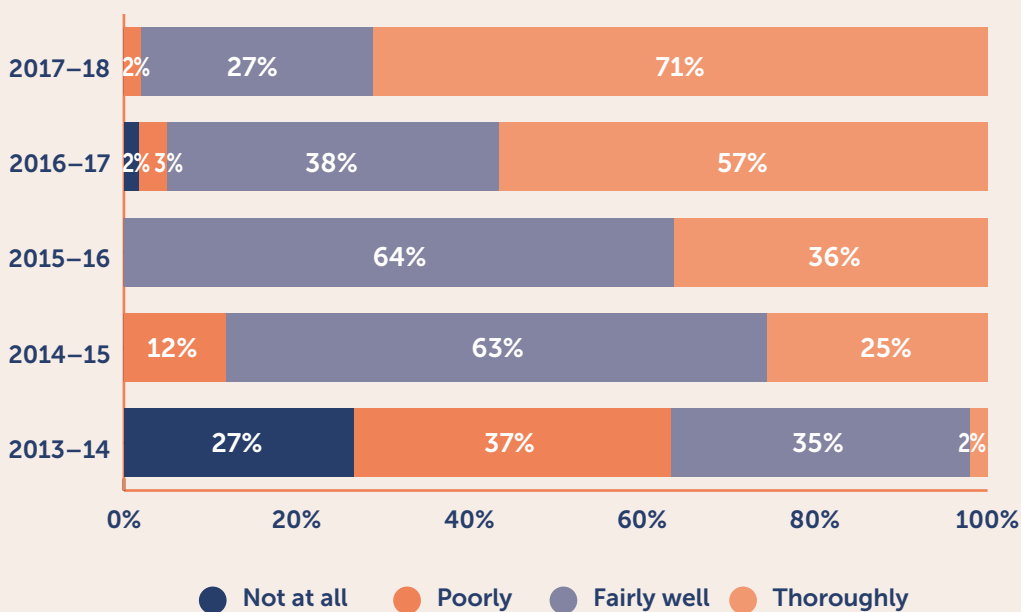
How well would you say you understand the structure of NGSS (the three dimensions)?



Source: Teacher Leadership Survey, administered by WestEd in 2014-15 (N=392), 2015-16 (N=358), 2016-17 (N=364), 2017-18 (N=302).

Figure D3. Core Teacher Leader understanding of the structure of the NGSS during the four years of the Initiative

How well would you say you understand the structure of NGSS (the three dimensions)?

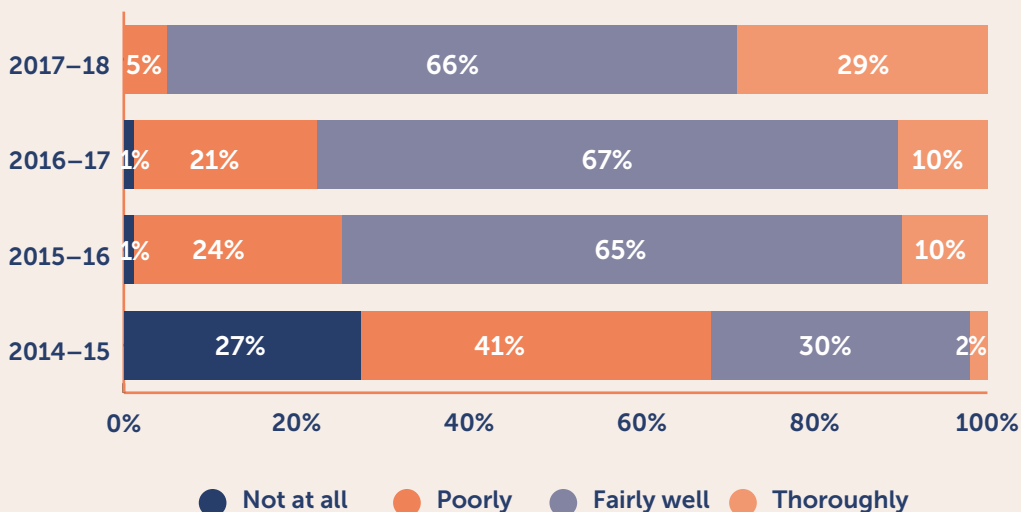


Source: Teacher Leadership Survey, administered by WestEd in 2013-14 (N=49), 2014-15 (N=51), 2015-16 (N=55), 2016-17 (N=60), 2017-18 (N=52).

Note: Baseline data for Core Teacher Leaders (i.e., 2013-14) were collected via a retrospective survey in spring 2015.

Figure D4. Teacher Leader understanding of the shifts in pedagogy entailed in transitioning to the NGSS during the four years of the Initiative

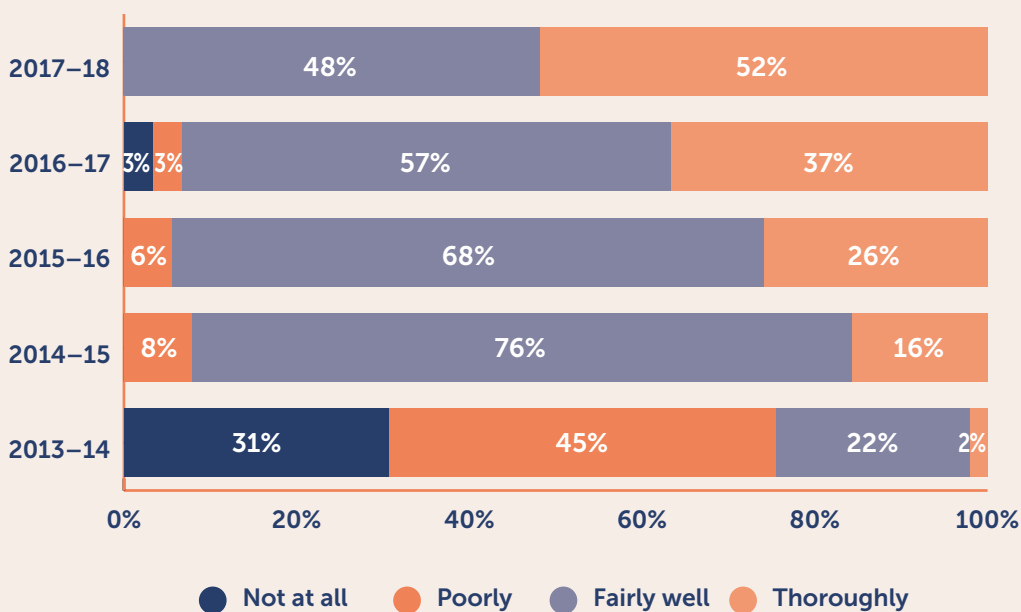
How well would you say you understand the shifts in pedagogy required to teach the NGSS?



Source: Teacher Leadership Survey, administered by WestEd in 2014-15 (N=390), 2015-16 (N=353), 2016-17 (N=367), 2017-18 (N=300).

Figure D5. Core Teacher Leader understanding of the shifts in pedagogy entailed in transitioning to the NGSS during the four years of the Initiative

How well would you say you understood the shift in pedagogy entailed in transitioning to NGSS?

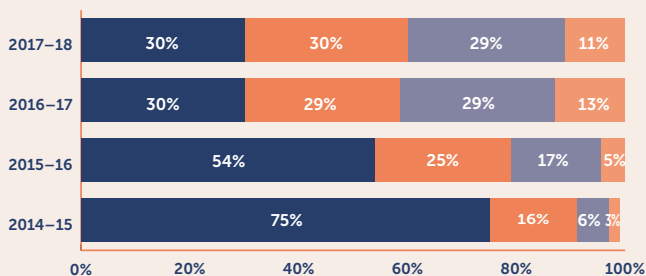


Source: Teacher Leadership Survey, administered by WestEd in 2013-14 (N=49), 2014-15 (N=51), 2015-16 (N=54), 2016-17 (N=60), 2017-18 (N=52).

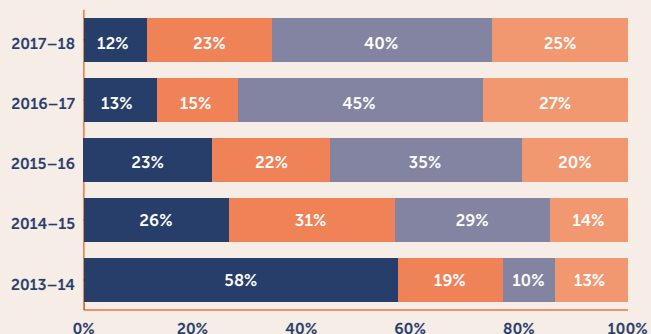
Note: Baseline data for Core Teacher Leaders (i.e., 2013-14) were collected via a retrospective survey in spring 2015.

Figure D6. Frequency of formal presentations about NGSS implementation at school and district levels by teacher leaders during the four years of the Initiative

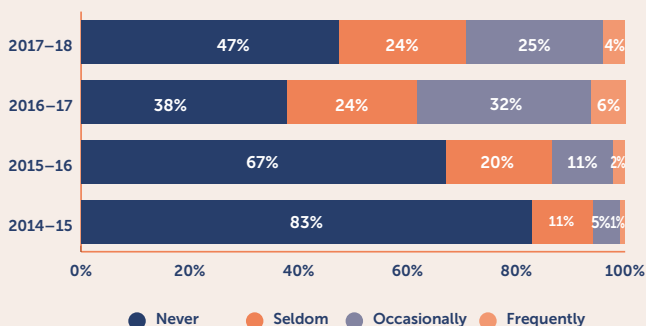
Teacher Leaders — School



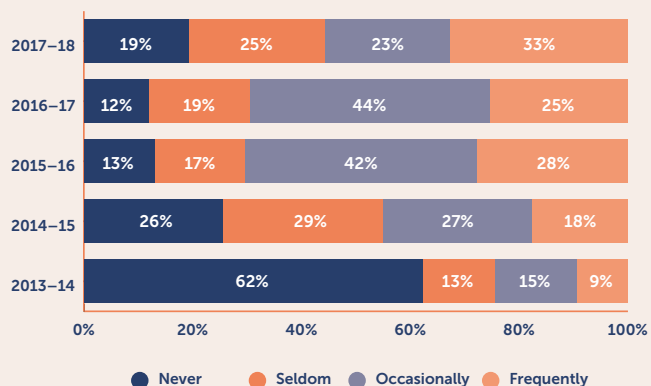
Core Teacher Leaders — School



Teacher Leaders — District



Core Teacher Leaders — District



Teacher Leaders — School Chart — *Source:* Teacher Leadership Survey, administered by WestEd in 2014–15 (N=386), 2015–16 (N=345), 2016–17 (N=367), 2017–18 (N=300).

Teacher Leaders — District Chart — *Source:* Teacher Leadership Survey, administered by WestEd in 2014–15 (N=385), 2015–16 (N=351), 2016–17 (N=366), 2017–18 (N=298).

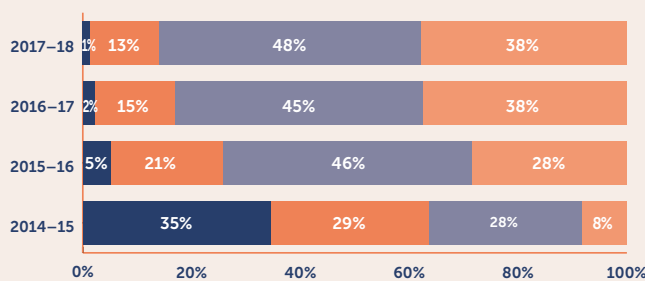
Core Teacher Leaders — School Chart — *Source:* Teacher Leadership Survey, administered by WestEd in 2013–14 (N=52), 2014–15 (N=49), 2015–16 (N=51), 2016–17 (N=60), 2017–18 (N=52).

Core Teacher Leaders — District Chart — *Source:* Teacher Leadership Survey, administered by WestEd in 2013–14 (N=53), 2014–15 (N=51), 2015–16 (N=54), 2016–17 (N=59), 2017–18 (N=52).

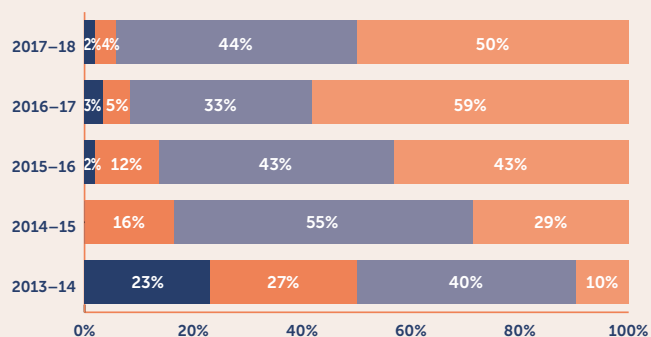
Note: Baseline data for Core Teacher Leaders (i.e., 2013–14) were collected via a retrospective survey in spring 2015.

Figure D7. Frequency of sharing NGSS instructional philosophies, strategies, and/or ideas with colleagues at school and district levels by teacher leaders during the four years of the Initiative

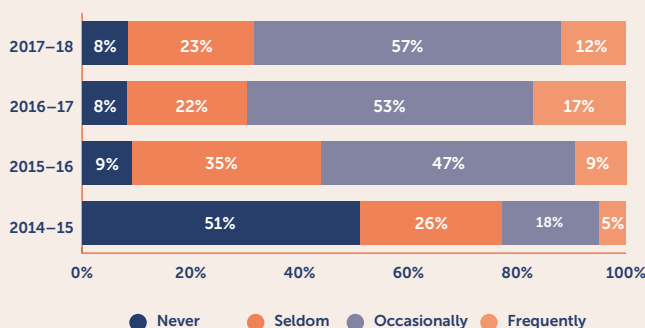
Teacher Leaders – School



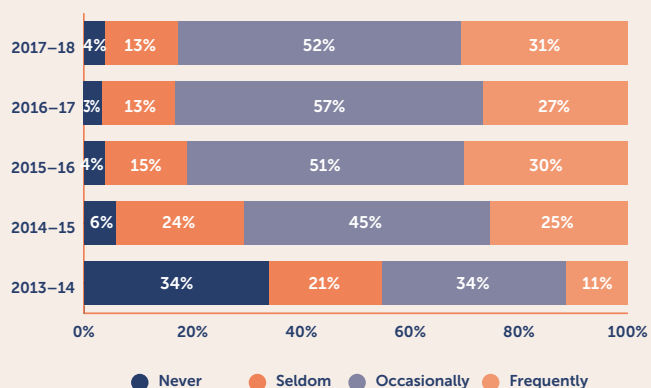
Core Teacher Leaders – School



Teacher Leaders – District



Core Teacher Leaders – District



Teacher Leaders – School Chart – *Source:* Teacher Leadership Survey, administered by WestEd in 2014–15 (N=385), 2015–16 (N=352), 2016–17 (N=367), 2017–18 (N=300).

Teacher Leaders – District Chart – *Source:* Teacher Leadership Survey, administered by WestEd in 2014–15 (N=384), 2015–16 (N=351), 2016–17 (N=367), 2017–18 (N=298).

Core Teacher Leaders – School Chart – *Source:* Teacher Leadership Survey, administered by WestEd in 2013–14 (N=52), 2014–15 (N=49), 2015–16 (N=51), 2016–17 (N=60), 2017–18 (N=52).

Core Teacher Leaders – District Chart – *Source:* Teacher Leadership Survey, administered by WestEd in 2013–14 (N=53), 2014–15 (N=51), 2015–16 (N=53), 2016–17 (N=60), 2017–18 (N=52).

Note: Baseline data for Core Teacher Leaders (i.e., 2013–14) were collected via a retrospective survey in spring 2015.

Appendix E.

Lighthouse Activities of Early Implementer Teachers

Early Implementer teachers are years ahead of most other California teachers of science in NGSS implementation, and they have a great deal to teach others. As part of the Initiative, participating districts were charged with not only involving every one of their science teachers in NGSS training, but also with acting as “lighthouse districts” to the entire state by sharing lessons learned with educators in non-Early Implementer districts and science education organizations and agencies. By year three of the Initiative, both Core Teacher Leaders and Teacher Leaders were engaged in lighthouse activities in three main ways: they disseminated information at **convenings** (e.g., conferences), hosted visitors in their **classrooms**, and provided **resources** to educators outside their district either directly (e.g., emails,

phone calls) or indirectly (e.g., posting information online).

Convenings

After only one year with the Initiative, teacher leaders began to share their NGSS expertise at professional conferences, especially the annual California Science Education Conference, sponsored in part by the California Science Teachers Association (CSTA). Most presentations were delivered in pairs, although some teacher leaders led sessions on their own. Approximately 15 Core Teacher Leaders and three to five Teacher Leaders have led presentations at CSTA in each of the past three years. See Table E1 for a complete list of California Science Education Conference presentations by teacher leaders between 2016 and 2018.

Table E1. California Science Education Conference presentations by Early Implementer Core Teacher Leaders and Teacher Leaders, 2016–2018

Presentation title	Presenter role
2016	
Focus on Practices: Math and Computational Thinking, Your New Favorite Practice	CTL
Integrating Science, ELA, and ELD: It All Works Together	CTL
Using Phenomenon as a Tool for Integrating CA-NGSS MS Instruction	CTL
Equity in the Science Classroom	TL
CA-NGSS Candy Catchers: Where Engineering Meets Science	CTL
Roller Coaster Physics with CA-NGSS	CTL
Reading in the Content Area	CTL
Let's Talk Engineering	CTL
Put Reading in Its Proper Place — Bringing Reading into Science Inquiry	CTL
Life Cycles: A 3rd Grade Three-Dimensional Learning Sequence	CTL
Student Driven Inquiry Within CA-NGSS	CTL
From Inquiry to CA-NGSS 3-D: Updating Your File Cabinet	TL
Use What You've Got: Transitioning to CA-NGSS Using Existing Curricula	TL
Just Map It: Map Skills in CA-NGSS Instruction	CTL
English Language Development in an Inquiry Based Science Classroom	CTL
Using LCAP to Leverage Science for ALL	CTL
Essences of Science Notebooks	CTL
Building a Better Bar: An Engineering Task for Life Sciences and Chemistry	TL
Bringing Engineering into Your Elementary Science Classroom	CTL
How Clean is Clean? Engineering a Water Filtration System	CTL
Writing in Science Investigations: Turning Oral Sense-Making into Logical Conclusions	TL
The Sun Drives It: How Earth Spheres Work Together	CTL
Cha Cha Changin': How the Earth's Surface Changes	CTL

Presentation title	Presenter role
From Worksheets to Interactive Science Notebooks: CA-NGSS Thinking Maps Support the Writing Development of English Language Learners	TL
Content Language Objectives in Science	TL
2017	
3D 5E Learning Sequence: Stream Tables	CTL
3D NGSS Lesson: Energy Transfer Through Collisions	CTL
Badwater 135: A 6th Grade Integrated Learning Sequence from the CA NGSS K-8 Early Implementation Initiative	CTL
Biological and Geological Changes in Earth's History	CTL
Chain Reactions, Energy on the Move: A 4th Grade Learning Sequence from the CA NGSS K-8 Early Implementation Initiative	CTL
From Inquiry to NGSS 3D — Updating Your File Cabinet	TL
From Phenomena to Lesson Sequence	CTL
K-2 3D Science + Engineering Early Implementers: Biomimicry Through Helmet	CTL
K-2 NGSS and Literacy Connections	CTL
Making Science Phenomenal! NGSS Early Implementers	CTL
Matter: A 2nd Grade Learning Sequence from the CA NGSS K-8 Early Implementation Initiative	TL
Playground Forces: A 3rd Grade Learning Sequence from the CA NGSS K-8 Early Implementation Initiative	CTL
Properties of Matter: 5E Learning Sequence on Density	CTL
SC12: Make Every Minute Count: A Winning Solution to Integrating Life Science 3D NGSS and Literacy CCSS/ELA in K-2 Classrooms	CTL
Systems in NGSS — It's All Connected!	CTL
Understanding White Sharks: An 8th Grade Integrated Learning Sequence from the CA NGSS K-8 Early Implementation Initiative	CTL
What Makes Things Move? A Kindergarten Learning Sequence from the CA NGSS K-8 Early Implementation Initiative	TL
What's in Our Water? A 5th Grade Learning Sequence from the CA NGSS K-8 Early Implementation Initiative	CTL
Where Do Trees Get All That Mass? A 7th Grade Integrated Learning Sequence from the CA NGSS K-8 Early Implementation Initiative	CTL

Presentation title	Presenter role
2018	
Where Do Trees Get All That Mass? A 7th Grade Integrated Learning Sequence	CTL
3D NGSS EI Lesson: Human Impact on Ecosystem	CTL
Badwater 135: A 6th Grade Learning Sequence	CTL
Chain Reactions, Energy on the Move: A 4th Grade Learning Sequence	CTL
Lights! Camera! Science! Integrating Filmmaking into NGSS	TL
Academic Vocabulary Through Engaging Phenomena	CTL
What Makes Things Move? A Kinder Learning Sequence	CTL
3D NGSS EI Lesson: Energy Transfer Through Collisions	CTL
3D 5E 2nd Grade Earth Science: Stream Tables	CTL
What's In Our Water? A 5th Grade Learning Sequence	CTL
3D NGSS Engineering: Biomimicry Through Helmet Designs	CTL
K-2 NGSS and Literacy Connections	CTL
NGSS: It's All About Observing and Asking Questions in TK	TL
Don't Dry for Me California: Climate Summit K-2 Grade Learning Sequences*	TL
Think Globally, Act Locally: Climate Summit 8th Grade Integrated Learning Sequence*	CTL
Dangerous Earth: Climate Summit 3–5th Grade Learning Sequences*	TL
Living in 3D - How to Plan and Use NGSS Assessments	TL
Climate, An Integrated Approach, Proof is in the Reefs!	CTL
Phenomenal Phenomena! What Makes It Phenomenal?	CTL
Hot and Out of Breath: Climate Summit 7th Grade Integrated Learning Sequence*	CTL
Take it to the Playground: A 3rd Grade Learning Sequence	CTL

Source: Observations and schedules for the annual California Science Education Conference in 2016, 2017, and 2018.

Notes:

In cases where they presented with a Core Teacher Leader, Teacher Leaders are credited. Similarly, some Core Teacher Leaders credited here may have co-presented with Project Directors, Regional Directors, or administrators.

Some of the Climate Summit sessions (noted with *) were collaboratively planned and presented with professional scientists.

A smaller number of teacher leaders have presented to national audiences. Two Teacher Leaders and a Regional Director presented *Implementing NGSS in the Upper Elementary Grades* at the 2017 National Science Teachers Association (NSTA) conference in Los Angeles. Other teacher leaders gave presentations in more informal settings. For example, in March 2017, a Core Teacher Leader and a Project Director presented to participants of the “Go Outside Network Workshop,” held at the Cosumnes River Preserve, on how to integrate the NGSS Crosscutting Concepts into a variety of education settings.

Classrooms

Teacher leaders have opened their classrooms and demonstrated NGSS lessons to visitors from outside the district. Often it was teachers from other districts who came to observe NGSS instruction. They might have made contact with an Early Implementer at a professional conference or been referred by an organization such as the California Science Project or an informal science education provider. In early 2017, a middle school in a large, urban district hosted California’s State Superintendent of Public Instruction, Tom Torlakson. He visited four classrooms, including that of an eighth grade Early Implementer Core

Teacher Leader. Students in the class carried out an investigation constructing magnets out of a battery, wire, and a carpentry nail, and then using the magnets to pick up paper clips (Tira, 2017). When interviewed by the press, the teacher said, “Our science is loud, our science is messy. We have our own Exploratorium here.” She had advice for other teachers about teaching NGSS science: “Be patient. It’s more work, but it’s a lot more fun, and the students’ depth of knowledge is great” (Jones, 2017).

Resources

Individual Early Implementer teachers have fielded requests for advice and have made available online resources they have developed. During one year, a Core Teacher Leader reported having received 10 emails regarding lessons he presented at various conferences. He also shared the district’s NGSS implementation plan with 11 teachers and coaches outside the district. Another Core Teacher Leader developed a process and template for creating three-dimensional summative assessments, which have been presented at CSTA. In 2019, the K–12 Alliance will be posting a series of K–8 learning sequences, developed collaboratively with Early Implementer teachers, on its website (<http://k12alliance.org/ca-ngss.php>).

Glossary

Achieve — An independent, nonpartisan, nonprofit education reform organization dedicated to working with states to raise academic standards and graduation requirements, improve assessments, and strengthen accountability. Created in 1996 by a bipartisan group of governors and business leaders, Achieve is leading the effort to make college and career readiness a priority across the country so that students graduating from high school are academically prepared for postsecondary success. Achieve coordinated the second phase of the NGSS development process on behalf of the lead states and other partners.

CSTA — California Science Teachers Association

Core Leadership Team (CLT) — Group of 3–5 administrators and 5–8 teachers, established at each district at the beginning of the Initiative. The CLT meets with its Project Director regularly during each school year to plan and lead all Early Implementers Initiative activities. The CLT also meets with its K–12 Alliance Regional Director for six Technical Assistance Days each school year.

Core Teacher Leader (CTL) — Teacher member of the Core Leadership Team. Provides professional learning to Teacher Leaders, other teachers, and/or administrators in their districts or at projectwide events such as the Summer Institute.

K–8 NGSS Early Implementers Initiative — Six-year Initiative (summer 2014 to spring 2020) supporting implementation of the NGSS by eight public school districts and two charter management organizations in California. Developed by the K–12 Alliance at WestEd in collaboration with the California State Board of Education, the California

Department of Education, and Achieve, the Early Implementers Initiative builds the capacity of participating local education agencies to fully implement the NGSS in grades K–8.

The K–12 Alliance — A WestEd program of science education leaders and professional learning providers who plan and deliver all projectwide activities for the Early Implementers Initiative.

NSTA — National Science Teachers Association

Norms — Agreed-upon productive behaviors and mindsets that guide a group when working together.

Professional learning — Contemporary terminology for professional development that emphasizes interactive learning strategies rather than rote learning techniques, where information is delivered to relatively passive listeners.

Project Director (PD) — District staff member responsible for leading all Early Implementers Initiative activities for the district and representing the district at monthly Initiative-wide planning meetings with Regional Directors.

Regional Director (RD) — Member of WestEd's K–12 Alliance staff assigned to provide leadership and support to one or two Early Implementers Initiative districts and to meet at monthly Initiative-wide planning meetings with Project Directors.

Summer Institute — Weeklong professional learning event held every summer to kick off the new Early Implementer school year. Attended by all Initiative participants, some as leaders (Regional

Directors, Project Directors, Core Leadership Team members) and others as learners (Teacher Leaders).

Teacher Leader (TL) — One of 30–70 teachers in each district who joined the Early Implementers Initiative in year two, one year after the Core Teacher Leaders. Teacher Leaders attend annual Summer Institutes and participate in two TLCs each school year, one in the fall and one in the spring, and other district-level professional learning.

Teaching Learning Collaborative (TLC) — Lesson-study activity brings together three to four same-grade Early Implementers Initiative teachers from different schools within the district. Teachers plan and teach a lesson to two classrooms of students. Each Teacher Leader participates in two Teaching Learning Collaboratives per year.

Technical Assistance Day — Meeting of the Core Leadership Team, facilitated by the K–12 Alliance Regional Project Director, to plan NGSS implementation in the district. Six days per school year.



Investing in Science Teacher Leadership

Strategies and Impacts in the
NGSS Early Implementers Initiative

EVALUATION REPORT 7

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